

# EXHIBIT B

**Expert Disclosure (Supplemental) - Dr. Stephanie Hurder**

(June 18, 2025)

Dr. Stephanie Hurder is a Partner & Co-Founder of Prysm Group. She will be called to testify regarding blockchain technology, digital assets, tokens, and token economics, as described in the Expert Disclosure dated March 5, 2025 and further described below.

**Section 1: TORN Governance Value and Tornado Cash DAO Activity**

1. The government asserts that the claim that demand for TORN was in part driven by the desire of users to participate in the Tornado Cash DAO governance is speculation. To the contrary, the design and function of the Tornado Cash DAO endowed token holders with decision-making rights that had economic value.
2. The economic value of decision-making rights endowed by financial assets has been well studied in the academic literature.
  - a. Decades of research in financial economics documents that equity shareholders derive economic value from voting rights, with voting premia as high as 10% (see e.g. DeAngelo and DeAngelo (1985), Barclay and Holderness (1989), Zingales (1995)).
  - b. The academic literature defining and quantifying the economic value of governance rights for blockchain-based tokens is rapidly growing (see e.g. Bakos and Halaburda (2023), Abadi and Brunnermaier (2025)).
3. In evaluating whether and how a governance token derives value from the governance process it is incorporated with, one standard practice is to evaluate the degree to which the DAO has the power to make and enforce impactful decisions or allocate resources (see e.g. Barrera and Hurder 2022). Based on my review of the proposals and voting history, the Tornado Cash DAO had a substantial scope of decision-making authority and the ability to enforce its decisions.
  - a. Between February 2021 and August 2022, participants in the DAO submitted and voted on 13 distinct proposals. These proposals covered numerous topics, indicating a large scope of decision-making authority for the DAO.
    - i. Governance participants were given approval rights over technical upgrades related to token-enabled systems.
      1. Proposal 1 enabled TORN token transfers.
      2. Proposal 4 provided a technical upgrade to the anonymity mining system.
    - ii. Governance participants were able to reallocate portions of the substantial TORN treasury funds to various uses.
      1. Proposal 6 allocated 120,000 TORN to a liquidity mining campaign on the Uniswap ETH/TORN pair. At the time of the proposal vote, these tokens had an aggregate value of ~\$13.8M.
      2. Proposal 12 allocated 100,000 TORN from the protocol treasury to the community fund to finance further software development and

- bug bounties.<sup>1</sup> At the time of the proposal vote, these tokens had an aggregate value of ~\$5M.
- iii. Governance participants could vote on changes to the governance process itself.
    - 1. Proposal 2 suggested lowering the quorum required for a successful vote.
    - 2. Proposal 9 restructured the governance contract.
  - b. The Tornado Cash DAO was designed so that decisions made by DAO voters were enforced and implemented.
    - i. Proposals for updates and changes had to be accompanied with executable code.
    - ii. Once a proposal was approved by DAO voters, any user could deploy the executable code provided with the proposal. All proposals approved by the DAO have been executed.
  - c. The DAO empowered the community to defeat proposals supported by the founding team.
    - i. Proposal 13, voted on between June 29 and July 4, 2022, received 174,120 votes from 34 addresses.
    - ii. It was defeated, with opposition primarily led by a single address that cast ~73k votes against the proposal. This voting stake required the address to invest \$1.8M in TORN.
4. Another standard method to quantify the value of a governance token is to use an opportunity cost analysis.<sup>2</sup> TORN token holders were willing to incur substantial capital and opportunity costs<sup>3</sup> in order to participate in governance voting, indicating the private benefits that voting provided.
- a. Throughout the pre and post-sanctions period, participation in the Tornado Cash DAO was robust.
    - i. Between February 2021 and August 2022, participants in the DAO submitted and voted on 13 distinct proposals.
    - ii. After sanctions, between September 2022 and June 2024, the DAO voted on 41 proposals.<sup>4</sup>
    - iii. The average proposal received 114,322 votes, with some proposals having over 50 distinct addresses participating.
  - b. Proposal 5 illustrates that tokenholders were willing to take as much as \$1M of financial risk in order to participate in voting on a single proposal.
    - i. In order to submit or vote on proposals, token holders had to stake their TORN tokens for 8.25 days, or until the end of the proposal execution

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<sup>1</sup> Bug bounty programs reward third party individuals for finding and reporting vulnerabilities in software or applications.

<sup>2</sup> This methodology is taught in leading courses including Wharton's *Economics of Blockchain and Digital Assets*.

<sup>3</sup> The opportunity cost of a choice is the value of the best alternative forgone where, given limited resources, a choice needs to be made between several mutually exclusive alternatives.

<sup>4</sup> Dr. Hurder may update this figure to include proposals through the time of trial.

- period. Token holders could not sell or transfer their tokens until this period had ended.
- ii. Proposal 5, which was voted on from April 10 to April 13, 2021, had 47,681 votes from 52 distinct addresses. This was the most active proposal prior to the introduction of staking rewards.
  - iii. In the two months prior to this proposal, TORN prices were trending down compared to the market, and TORN was substantially more volatile than the market.
    1. From 2/8/2021<sup>5</sup> to 4/10/2021, the average daily change in TORN price was -0.01% with a standard deviation of 13.1%.
    2. The average daily change in BTC (ETH) price was 0.76% (0.53%) with a standard deviation of 3.4% (3.7%).
  - iv. As such, staking TORN was a nontrivial risk even compared to other crypto assets during this time period because it removed the option to sell or trade the TORN tokens to take advantage of capital gains or stem losses.
  - v. At the time the 8.25 day period commenced for Proposal 5, the ~47.6k staked TORN required a capital investment of \$5.9M.
  - vi. By the end of the 8.25 day lock-up period, the TORN value had fallen to ~\$5.0M.
  - vii. Had the same TORN not been locked up in governance and could be sold or traded during the 8.25 day period, it could have been sold for as much as \$6.1M.
  - viii. Had the same capital been invested in ETH during the same period, it could have been sold for as much as \$6.8M.
  - ix. Thus, locking up tokens in order to vote on this proposal could have had an opportunity cost of \$1M - \$1.8M for the voting participants.
5. A final, common method to quantify the value governance gives to a governance token is to analyze events where the governance function is suddenly removed. The malicious hack of the DAO in May 2023, which temporarily disabled the governance functionality of the DAO, had a substantial negative impact on the TORN token price, indicating the governance value of the TORN token.
- a. An attacker submitted a hidden malicious proposal to the DAO, which was approved by DAO stakeholders on May 18, 2023.
  - b. The attacker was able to take control over the DAO and 1.2 million TORN tokens.
  - c. The attack was publicized via various news sources on May 21, 2023.
  - d. The day before the attack was finalized, on May 17, 2023, TORN had been trading at \$6.63. In the two weeks following the attack, the price of TORN fell to \$3.88. This is a decrease of ~41%.
  - e. In contrast, ETH and BTC prices rose slightly (3.8% and 1.2%).

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<sup>5</sup> This was the date that TORN started trading.

- f. Using regression analysis to control for market movements, the DAO hack was associated with a 54% net decrease in the price of TORN, which was statistically significant at the 1% level.<sup>6</sup>
6. The government also claims that the statement that governance rights created value for TORN tokens is “irrelevant in any event, because whether TORN had governance value says nothing about whether it could *a/so* be used to generate profits from monetizing the fees charged by the Tornado Cash service.”
  - a. Understanding the governance value of the TORN token is essential to understanding whether the government’s claim of “monetization” is true.
  - b. Because users found governance rights to be valuable, they were willing to incur opportunity costs staking their tokens in order to submit proposals or vote.
  - c. The use of relayer commissions as staking rewards for governance participants simply helped to reduce the opportunity cost of participating in governance.

## Section 2: TORN Token Price Movements and Tornado Cash Smart Contract Activity

1. It is well documented in the academic literature that the prices of various cryptocurrencies are highly correlated.
  - a. The Chicago Federal Reserve finds that “most of the variations in the prices in the cryptocurrency market are the results of the market’s spillovers and only a small fraction can be ascribed to the idiosyncratic characteristics of individual digital currencies.” (Ferroni 2022).
2. Correlation is a standard descriptive statistic used to quantify the comovement of cryptocurrency prices, in particular comovement with the market as proxied by BTC and ETH (see e.g. Bui et al 2025, Katsiampa et al 2022).
3. Regression analysis confirms the conclusions from the original Expert Disclosure that price movements of TORN are significantly correlated with the movements in the price of BTC and ETH, and especially after the launch of the relayer registry.
  - a. In the period between June 11, 2021<sup>7</sup> and August 7, 2022<sup>8</sup>, a 1% increase in the price of BTC (ETH) is associated with a 0.95% (0.73%) increase in the price of TORN. These relationships are statistically significant at 1%. Movements in the price of BTC (ETH) explain 58% (52%) of the variance in the price of TORN for the time period.
  - b. In the period between March 1, 2022<sup>9</sup> and August 7, 2022, a 1% increase in the price of BTC (ETH) is associated with a 1.11% (0.88%) increase in the price of TORN. These relationships are statistically significant at 1%. Movements in the

<sup>6</sup> Following the recommendations of Gelman and Hill (2006), log-log regressions are used to estimate comovement among positive variables. “Statistically significant at the 1% level” indicates that there is less than a 1% chance that the result occurred by chance alone. It is considered highly significant.

<sup>7</sup> This is the date on which TORN is listed on Binance, thus providing substantial liquidity and improved price discovery.

<sup>8</sup> This is the day before government sanctions are imposed.

<sup>9</sup> This is the date of the Medium post announcing the launch of the relayer registry.

price of BTC (ETH) explain 82% (87%) of the variance in the price of TORN for the time period.

4. Contrary to the government's claims, the Ronin Hack is a significant event that is informative regarding the dynamics of the price of the TORN token.
  - a. According to SA DeCapua (and subject to verification and rebuttal), the Ronin Hack was by far the largest of the notable exploits that were transmitted through Tornado Cash from September 2020 through July 2022. The Ronin hack alone constituted ~38% of the \$1.191B in total exploits calculated by Agent DeCapua.
5. The arguments made in the original Expert Disclosure of the impact of the news of the Ronin Hack and the alleged deposits did not require regression analysis to achieve their conclusions.
  - a. The assertion that the news of the Ronin Hack did not benefit the price of TORN is supported by noting that the price of TORN decreased more than the price of the market proxies during the period in question.
  - b. The lack of correlation between the alleged Ronin Hack deposits and the price of TORN, combined with visual inspection of the two time series, suggests there is no immediate evidence of a linear relationship between the two. Absent a compelling alternative theory of a nonlinear relationship or an omitted variable, there is no reason to conduct a regression analysis.
6. Nevertheless, regression analysis confirms that the public announcement of the Ronin Hack did not benefit the TORN token price, but in fact appears to have harmed it.
  - a. Controlling for market movements, in the two weeks following the public announcement of the Ronin Hack, the price of TORN dropped net 14%. This is statistically significant at 1%.
7. Regression analysis also confirms that alleged deposits of Ronin Hack proceeds did not appear to explain variation in the price of TORN.
  - a. Controlling for market movements, the quantity of deposits that allegedly stem from the Ronin Hack did not explain variation in the price of the TORN token. Coefficients on the Ronin Hack values were not statistically significant, and including them in the model did not improve the explanatory power of the regression model.

### Section 3 : Definitions

1. A protocol fee ("protocol fee") is a fee or commission charged by a DeFi protocol for its use that is retained by the project's governance or treasury. Protocol fees may be collected at the same time as fees not retained by the protocol, such as transaction fees that are paid to liquidity providers or gas fees paid to the blockchain on which the protocol operates. These protocol fees form a portion, if not the entirety, of a decentralized project's revenue. Common uses of protocol fees include funding protocol development or providing rewards to incentivise protocol users to take specific actions. Industry aggregators such as DefiLlama (<https://defillama.com/>) provide revenue numbers for protocols that charge protocol fees.

2. Liquidity mining is a process where users (“liquidity providers”) provide cryptocurrencies (“liquidity provision”) to liquidity pools on decentralized exchanges in exchange for rewards, such as transaction fees or native tokens.

Sources consulted:

1. Tornado Cash Medium posts, project documentation, and governance website.
2. The government’s expert disclosure production.
3. IntoTheBlock token price and circulating supply data for TORN, BTC, and ETH.
4. Etherscan data for TORN token activity.
5. Books and book chapters:
  - a. Barrera, C. and S. Hurder. “Cryptoeconomics: Designing Effective Incentives and Governance Models for Blockchain Networks Using Insights from Economics” *Blockchains and the Token Economy: Studies in Theory and Practice*, edited by M. Lacity and H. Treiblmaier, Palgrave-Macmillan, 2022.
  - b. Gelman, A. and J. Hill. *Data Analysis Using Regression and Multilevel/Hierarchical Models*, Cambridge University Press, 2006.
6. Academic articles:
  - a. Abadi, J. and M. Brunnermaier. “Token-Based Platform Governance.” Federal Reserve Bank of Philadelphia Working Paper WP 25-17, May 2025.
  - b. Bakos, Y. and H. Halaburda. “Will Blockchains Disintermediate Platforms? Limits to Decentralization in DAOs.” Paper presented at *Theory in Economics of Information Systems*, Banff, Alberta, Canada, April 1 2023.
  - c. Barclay, M. and C. Holderness. “Private benefits from control of public corporations.” *Journal of Financial Economics*, vol. 2, no. 2, 1989, pp. 371-395.
  - d. Bui, H., C. Schinckus, and H. Al-Jaifi. “Long-range correlations in cryptocurrency markets: A multi-scale DFA approach.” *Physica A: Statistical Mechanics and its Applications*, vol. 661, 2025.
  - e. DeAngelo, H. and L. DeAngelo. “Managerial ownership of voting rights: A study of public corporations with dual classes of common stock.” *Journal of Financial Economics*, vol. 14, no. 1, 1985, pp. 33-69.
  - f. Ferroni, F. “How Interconnected Are Cryptocurrencies and What Does This Mean for Risk Measurement?” Chicago Fed Letter, No. 466, March 2022.
  - g. Katsiampa, P., L. Yarovaya, and D. Zieba. “High-frequency connectedness between Bitcoin and other top-traded crypto assets during the COVID-19 crisis.” *Journal of International Financial Markets, Institutions and Money*, vol. 79, 2022.
  - h. Zingales, L. “What Determines the Value of Corporate Votes?” *The Quarterly Journal of Economics*, vol. 110, no. 4, 1995, pp. 1047–1073.
7. Coindesk articles:
  - a. <https://www.coindesk.com/tech/2023/05/21/attacker-takes-over-tornado-cash-dao-with-vote-fraud-token-slumps-40>

Respectfully Submitted,

Signed by:

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